The paper “Triggering volcanic eruptions by gas bubbles accumulations in the magma chamber” by Godano et al. develops a sophisticated semi-analytical model for Strombolian eruptions in terms of probabilities of erupted volumes and characteristic times of eruption supported by the comparison with volcanological data on the occurrences of eruptions over the whole interval of possible erupted volumes.

The model is quite well described from the mathematical point of view, but it lacks of the physical justification for the mathematical assumptions. The authors clearly state that the model hypothesis are simply mathematical, but a wider perspective of what this mathematics implies would improve the quality of the paper. Also some assumptions, like the neglect of the downward buoyancy of dense blobs, could be assessed by dimensional analysis.

Specific comments:

Line 44: “the result seems to be applicable to a broader range of eruptive styles”. It is not demonstrated in the followings that the model may be applied to more volcanic cases. I would suggest to use a more prudent sentence.

Lines 116-177: “Within this overall scenario, it is reasonable to hypothesize that the friction, generated by the viscosity, can contrast the sedimentation of the blobs due to gravity.” This hypothesis should be supported with a dimensional analysis. The same comment applies to line 208.

Lines 120-122: “Admittedly, large-scale convective motion can occur within magma chambers; however, this does not preclude the diffusive behavior of the blobs”. Convection and diffusion can coexist, but the strength of convection and diffusion should be compared in some way, particularly because in Conclusions it is written “small local convective motion” (line288).

Line 133: “For simplicity, we assume that the force pushing the blobs upwards increases linearly in time with constant rate λ”. This is a crucial assumption. The authors could provide a sensitivity analysis on other possible dependency on time as they do for the α coefficient.

Line 152: “the exponential decay becomes dominant, with respect to the power law term, at $2 \cdot 10^3$ Mm^3 .” Write “about $2 \cdot 10^3$ Mm^3 “, this is only indicative, not exact.

Line 171: “At the same time a new blob is positioned at a random location in the box”. The creation of a new blob is needed to maintain the total number of blobs constant, but it should be also justified physically. Also the need to have constant N should be discussed.

Line 192: “For simplicity, we assume a linear time trend $V_{v,i}(t) = \alpha(t - \tau_{V,i})$”. The authors consider in details the bubble nucleation law (Section 2.2.1). If possible, they could extend this analysis to the growth of bubbles below the dense magma blobs to physically justify the assumed linear growth.

Line 195: which is the rationale for the choice of the exponential distribution for $\tau_{V,i}$? Further, τ_s is not defined.

Section 4.2: all reduced units employed for computations and map into physical units has to be clearly explained, possibly with a table.

Line 227: please clarify how is defined a stationary thermalized state.

Line 239: how is it justified that the Boltzmann constant is taken equal to one?

Line 247: “Concerning instead the right tail, …” Refer again to Figure 4, writing this after the comment to Figure 5 is misleading.

Tecnical corrections:

Line 186: $\Delta\rho_{dm}$ is not defined.

Caption of Figure 6: τ_r should be τ_{er}